CLAIMS

What is claimed is:

1. A slider for burnishing asperities and cleaning loose particles that adhere to magnetic recording media, the slider comprising:

a body having an air bearing surface including a leading edge, a trailing edge, an inner edge, and an outer edge, the inner and outer edges extending between the leading and trailing edges and defining a longitudinal axis, and a lateral axis perpendicular to the longitudinal axis that extends between the inner and outer edges;

a plurality of rails on the air bearing surface, each of the rails being oriented at an acute angle with respect to the longitudinal axis such that the rails are defined as diagonal relative thereto, the rails being adapted to push the loose particles away from a surface of the magnetic recording media; and

each of the rails having an inner portion that is closer to the inner edge and an outer portion that is closer to the outer edge, and the inner portions being closer to the leading edge than respective ones of the outer portions.

2. The slider of claim 1, further comprising at least one leading edge pad that is independent of the rails and located adjacent to an outer area of the leading edge.

3. The slider of claim 2, wherein said at least one leading edge pad is congruent with at least one of the inner portions of the rails.

4. The slider of claim 2, wherein said at least one leading edge pad and at least one of the inner portions of the rails have a step taper to provide a pitch-producing lift force for the slider.

5. The slider of claim 1, further comprising at least one trailing edge pad that is independent of the rails and located adjacent to the trailing edge.

6. The slider of claim 5, wherein said at least one trailing edge pad comprises three trailing edge pads, with a first trailing edge pad being congruent with the outer portions of the rails, and two of the trailing edge pads being smaller in size than the first trailing edge pad.

7. The slider of claim 1, further comprising at least one rail pad on each of the rails, the rail pads defining pockets, and the rail pads being adapted to retain loose particles in the pockets thereof and burnish asperities.

8. The slider of claim 1, wherein the plurality of rails comprises three parallel rails.

9. The slider of claim 1, wherein one of the rails is a middle rail that extends from an inner area of the leading edge to an outer area of the trailing edge.

10. The slider of claim 9, wherein the inner portion of the middle rail is a leading edge pad, the outer portion of the middle rail is a trailing edge pad, and three additional rail pads are symmetrically disposed between the leading and trailing edge pads of the middle rail, and wherein all of the pads are generally rectangular in shape with rounded edges.

11. The slider of claim 1, wherein the inner portion of an inner rail extends from approximately a midpoint of the inner edge to approximately a midpoint of the trailing edge, and an inner portion of an outer rail extends from approximately a midpoint of the leading edge to approximately a midpoint of the outer edge.

12. The slider of claim 11, wherein the inner and outer rails are equal in length, and each has a single rail pad that is symmetrically disposed between the respective inner and outer portions thereof.

13. The slider of claim 12, wherein all of the inner portions, outer portions, and pads align to define longitudinal columns and lateral rows.

14. A slider for burnishing asperities and cleaning loose particles that adhere to magnetic recording media, the slider comprising:

a body having an air bearing surface including a leading edge, a trailing edge, an inner edge, and an outer edge, the inner and outer edges extending between the leading and trailing edges and defining a longitudinal axis, and a lateral axis perpendicular to the longitudinal axis that extends between the inner and outer edges;

a set of trailing pads located adjacent to the trailing edge;

a central rail on the air bearing surface aligned with the longitudinal axis, the central rail having a leading portion and a trailing portion;

a pair of side rails symmetrically arrayed about the longitudinal axis and with respect to the central rail, each of the side rails having a leading portion and a trailing portion that extends away from the central rail; and

the leading portions of the central and side rails are wider in a lateral direction than their respective trailing portions.

15. The slider of claim 14, further comprising a leading edge step taper formed on each of the leading portions of the central and side rails.

16. The slider of claim 14, wherein each of the central and side rails is octagonal in shape.

17. The slider of claim 16, wherein outer trailing corners of the side rails are rounded.

18. The slider of claim 14, wherein a trailing portion of the central rail terminates approximately at a midpoint of both the longitudinal and lateral axes.

19. The slider of claim 14, wherein the side rails are swept back toward the inner and outer edges, respectively, in a delta-like configuration.

20. The slider of claim 14, wherein there are four symmetrically arrayed trailing pads along the trailing edge, and each of the trailing pads is pentagonal in shape.

21. The slider of claim 14, wherein the leading portions of the side rails are spaced away from the inner and outer edges, respectively, such that the leading portions of the side rails are located closer to the central rail.

22. A method of burnishing asperities and cleaning loose particles that adhere to a surface of a media, comprising:

(a) providing a slider adjacent to a rotatable media having a surface having asperities and particles;

(a) applying a controllable contact force by the slider relative to the media to burnish the asperities and particles that are partially attached to the media;

(b) cleaning the loose particles from the media while flying the slider in a stable fashion; and

(c) controlling a contact force of the slider and a fly height of the slider by changing a linear velocity of the media, such that the contact force increases gradually with a decrease in velocity, allowing for fine adjustments in a magnitude of the contact force.

23. The method of claim 22, further comprising contacting the media with trailing edge pads on the slider when the linear velocity is lower than a threshold velocity, and sweeping away larger particles when flying above the threshold velocity.

24. The method of claim 23, further comprising reducing a dynamic roll of the slider with the trailing edge pads, and providing smaller middle trailing edge pads for a more uniform and mild contact pressure distribution.

25. The method of claim 23, further comprising providing some lift with the trailing edge pads during flying and entering the trailing edge pads into contact with the media during burnishing.

26. The method of claim 22, further comprising flying the slider in a low pitch configuration relative to the media.

27. The method of claim 22, wherein the slider has pads with pockets, and further comprising retaining loose contamination and debris in the pockets.

28. The method of claim 27, further comprising burnishing asperities with the pads.

29. The method of claim 22, further comprising providing a pitch-producing lift force with a step taper located at a leading edge of the slider.

30. The method of claim 22, further comprising adjusting the contact force by changing the gram load while still retaining the fine adjustability via a change in the velocity.

31. The method of claim 22, wherein, after burnishing and cleaning, performing a glide test on the media at a required glide height.